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On the Sedges of Nebraska (Family Cyperaceae)

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II.—ON THE SEDGES OF NEBRASKA (FAMILY CYPERACEAE)

BY JOHN MALLORY BATES

INTRODUCTION

The sedges (Family *Cyperaceae*) are grass-like plants, but easily distinguished from the true grasses (*Poaceae*) by the following characteristics: culms solid, pithy, cylindrical, trigonous or flattened. Grass culms by contrast are mostly hollow and cylindrical. Sheaths not open lengthwise opposite the leaf blade, tightly enclosing the culm. Spikes simple or compound, mostly subtended by leaflike bracts, which are sometimes longer than the culm. Spikelets one- to many-flowered, each flower subtended and sometimes embraced by a single short herbaceous or scarious bract or scale, the most characteristic mark of this family. Fruit an achene, trigonous, lenticular, or plano-convex; in the genus *Carex* only, it is enclosed in a herbaceous sac called the perigynium.

Like grasses, they grow in all kinds of soil from the wettest to the driest, in the densest shade and on the open prairie, from the tropics to the limits of vegetation in latitude and altitude. Many are especially hardy, and flourish in the altitudes where grasses are few, and start in the spring when pastures are still bare, affording short feed for stock when it is most needed. On the average, they are not as valuable for hay and pasturage as the grasses, which is plainly shown by the fact that man has never found one that seemed worthy of cultivation for agricultural purposes, in rivalry with the grasses, which constitute the most valuable family of plants for the use of man in civilization.

Nevertheless the sedges form, in a stock-raising state like Nebraska, a not unimportant part of both hay and pasturage, and are eaten greedily, not only from necessity at times, but also for the very desirable variety that is thus added to the rations of our

stock. In some swales and marshes where hay can be cut in the drier years, they outbulk the grasses ten to one, and the hay passes unquestioned in the market with no detriment to either horses or cattle.

The Study of the Sedges

After studying the sedges for twenty-four years, I can say that while they are undoubtedly as difficult as any of the flowering plants, there are none that give greater pleasure to the earnest student of systematic botany, for it is the difficult things in life that call out our resources and develop our powers. Yet I observe that but few college or university students have shown an interest in them, and fear that it is because the sedges bear a bad reputation. I imagine, also, that it is partly because the collector finds that he can do little with them in bloom, beyond settling the genus, and he does not always have the opportunity to follow up the same set of plants into fruiting time and so complete his work. As I wish to increase the number of sedge students, especially among high school teachers, who have the opportunity of collecting all over the state, I venture to insert some practical suggestions that will facilitate the work.

Collect only (after a few studies in the floral construction of several genera) in fairly mature fruit, one to two months (a little more or less) after blooming. If over-ripe, save achenes in packets labeled exactly as is the plant. If scales are dropping, include them in good quantity with achenes. Use Britton's *Manual,* because it covers practically all our Nebraska forms. Use Gray's seventh edition *Manual* because it has the most scientific and practical keys that have so far been given to American students. It is a delight to use them. Proceed slowly; exercise great patience with your own success for a time. If you get a name from one whom you trust, go through all the steps as if you knew nothing about the name, and prove him right or wrong, as the case may be. A road often trod grows shorter with use. I can not say too emphatically, study sedges by groups of the most closely related species. Collect; *collect;* COLLECT! Mount and lay away an abundance of good material on each sheet without

any study at all. Then when you have several hundred sheets and have leisure for slow work, study them for the prime object of segregating them into groups of closely related forms, such as (for instance) *Carex parryana, fusca, stricta, nebraskensis* and *aquatilis,* all Nebraska species. My own herbarium contains 516 sheets of *Carex* alone, representing over 160 species. You can get no intelligent view of so large and difficult a genus without this kind of work. The subgenus *Vignea* is probably more difficult than *Eucarex,* and the *straminea* group the hardest of all. It is better to leave these until some experience has been gained in other parts of the genus; but collect everything. You will never regret it, if you really become a sedge student. In order to see clearly the finer markings of the smaller achenes (about a half a millimeter in length) use a magnifier of 20 diameters. The cross striations and tubercular markings will be most interesting.

The Present Treatment of the Subject

The object of this bulletin is to bring our Nebraska sedges into critical relation with our latest manuals and with the studies of this subject that have been made and are now making in neighboring states. I have followed the order of Britton's *Manual,* because it contains practically all of our species. I have followed his nomenclature for convenience, except where Gray's seemed more in accordance with the facts as shown by our plants. It makes no difference to me whether I say *Carex fusca* or *buxbaumii,* but it makes much difference whether I say *Carex haydeni* or *Carex stricta decora.* I have used this discrimination several times.

I have given the county once for each citation of a locality, and several times where special emphasis on the locality of rare or otherwise important plants seemed to call for it. Credit has been given to herbaria rather than to collectors by name. The Seminar Herbarium of the State University has sedges contributed by Smith and Pound, H. J. Webber, Pound and Clements, J. J. Thornber, P. J. O'Gara, P. A. Rydberg, Bates, Hapeman, and several others. It has saved time and space to credit these simply "(Uni.)." Dr. Hapeman's own collection is marked "(Hapeman)" and mine "(Bates)." Our plants are found in all three by

exchange or gift, but such sheets are not recognized in these notes. There is no unnecessary repetition. Several fine species or varieties are represented by only one sheet in the Seminar collection and it is very difficult now to ascertain the exact locality of collection, that we may mend this condition. I hope this revision and publication will stimulate such inquiry among those who live at these various stations. The last full catalog of the state Flora (1889) gave us 39 species of sedges, six of which have never been found in the state, so far as our specimens indicate. A few others have since been found that were then only accredited by the manuals. I now show in this bulletin 103 species, varieties and forms worthy of description; 42 of which are reached before we come to *Carex*, 61 in *Carex* alone. This is a most encouraging showing, and I hope that the next twenty-three years may be equally fruitful. I confidently assert that not one thousandth part of Nebraska has been studied by any critical student of this group. What then may we not expect for our state when its survey shall have been more nearly completed!

It is interesting to compare our findings with those of Iowa on the east of the Missouri River. *The Iowa Sedges* issued in 1898 by R. I. Cratty, a most creditable production, enumerates 114 species and varieties. Mr. Cratty writes me that six more should now be included, making 120 in all. This does not mean that Iowa has 17 more species than Nebraska, but rather that its plants have been studied much longer and more thoroughly. It suggests to us that we must explore our great and productive territory before a denser population and more intensive cultivation destroy and radically change our native flora.

I have no doubt that errors of judgment will be found in this bulletin. In my second revision of these sedges just before writing, I made several changes in identification. Another revision might result in still more. I only ask that the work be found worthy of candid criticism.

To Dr. Charles E. Bessey, the Nestor of western botanists, I owe whatever of inspiration I have. He guided my infant footsteps in systematic botany when I was forty-three years old. He never fails to kindle the latent spark in young or old. I thank

him for the confidence displayed in entrusting this work to me, a neophyte, and hope it has not been wholly misplaced. For the use of Boott's *Magnum opus* on the genus *Carex,* and his encouraging words as I have read him parts of the Bulletin this winter, I am grateful.

If this effort shall result in making real progress in the survey of the state, I shall be content. It has been a labor of love.

RED CLOUD, NEBRASKA,
January 31, 1913

I. CYPERUS L.

1. **C. diandrus** Torr. Annual; in saturated soil, sand bars, etc., widely distributed. Valentine and Kennedy, Cherry Co.; Atkinson, Holt Co.; Callaway, Custer Co.; St. Paul, Howard Co. (Bates); Plummer's Ford, Thomas Co.; Pishelville, Knox Co. (University). I have seen it in many localities where it seemed too common to notice.
2. **C. rivularis** Kunth. Annual; in same habitat and at first glance looking like the last, but a good species. More common, apparently. Valentine; Callaway (Bates); Plummer's Ford; Nebraska City, Otoe Co.; Richardson Co.; Thedford, Thomas Co.; Bellevue, Douglas Co.; Franklin Co.; St. Paul; Pishelville; Atkinson (Uni.); Minden, Kearney Co. (Dr. Hapeman).
3. **C. aristatus** Rottb. (*inflexus* Muhl.) Annual; in same habitat; more common than the collections indicate. Red Cloud; Valentine; Callaway; (Bates); Minden (Dr. Hapeman); Lincoln, Laancaster Co.; Mullen, Hooker Co.; Cherry Co.; Pine Ridge, Sheridan Co.; northern Holt Co.; Scott's Bluff Co.; Thedford; Franklin, Franklin Co. (Uni.).
4. **C. schweinitzii** Torr. Perennial; in poor, dry, sandy soil. Valentine; Kennedy; Ewing, Holt Co.; St. Paul; Red Cloud, Webster Co. (Bates); Minden (Dr. Hapeman); Thedford; Broken Bow, Custer Co.; Knox Co.; Franklin; Arapahoe, Furnas Co.; Louisville, Cass Co.; Dismal River, Hooker Co. (Uni.).

   C. bushii Britton should be noticed here as probably occurring in Nebraska. Dr. Britton so includes us in his

range given in Appendix to his *Manual*, 1st ed. I find one sheet in the Seminar Herbarium contributed and named by the late Wm. Clebourne of Omaha, before *C. bushii* was known. The label reads thus: "*Cyperus esculentus* L. Sand flats south of Lake Manawa. Aug. 8, 1902." It is a fine specimen of *C. bushii* Britton, but we cannot claim it, as Lake Manawa is wholly in Iowa. Collectors in that part of the state will confer a great favor by hunting for it in similar situations.[1]

5. **C. acuminatus** Torr. and Hook. Annual; sand bars and other saturated soil. Valentine; Atkinson; Ewing (Bates); Minden; Edgar, Clay Co.; Lincoln; Franklin; Red Cloud; Loup City, Sherman Co. (Uni.).
6. **C. esculentus** L. Perennial; in sandy soil, wet and dry. Kennedy; Wood Lake, Cherry Co.; Ewing; Callaway; Red Cloud (Bates); Lincoln; Norfolk, Madison Co.; northern Holt Co. (Uni.).
7. **C. erythrorhizos** Muhl. Annual; in wetter soil than the last; not common. Ewing; Lincoln; Columbus; St. Paul (Bates); Lincoln; Norfolk; northern Holt Co. (Uni.).
8. **C. engelmanni** Steud. Annual; only in saturated soil. Kennedy, Cherry Co. (Bates). This rare species is in the

[1] Since writing up *Cyperus schweinitzii* and *C. bushii*, I have written to Dr. Rydberg, asking for the data upon which *bushii* was accredited to Nebraska in Britton's *Manual*. He kindly reported several sheets from the University collection and my own. I have gone over again all our material and find none, not even the Lake Manawa specimen, that bear out the contention. Ours have all degrees of roughness of culm and leaves, but none "smooth" according to the requirements of both Britton and Small. We have all forms of scale, cuspidate, acuminate and barely acute, chiefly 9-nerved. I am convinced that either this material should be included under one species not more variable than a thousand others, or else that we at least can lay no claim to it. Our specimen from Lake Manawa, Iowa, has lightly scabrous culms above and leaves strongly and finely serrulate and lightly scabrous above; scales strongly cuspidate, so that it can not come under the description of *bushii*. We have none without some serrulation on the leaves, and only two sheets that are without cuspidate scales. We find on the same plant scales obtuse, acute and cuspidate.

Boardman swamp on the edge of stagnant water, less than a half a mile northwest of John Bachelor's old ranchhouse, two or three dozen plants, 3–8 inches high. I took Nelson S. Rowley, ranchman and County Commissioner, to identify the spot, so that other collectors might find it. August, 1910, 1911, 1912. Iowa does not report it. It is one of Nebraska's many good things.

9. **C. strigosus** L. Perennial; mostly in saturated soil; in many forms, perhaps the commonest species in the state. Valentine; Kennedy; Long Pine; Ewing; Columbus; St. Paul (Bates); Head of Dismal River; Thedford; northern Holt Co.; Nebraska City; Republican City (Uni.); Minden (Dr. H. Hapeman).
   a. var. **robustior** Kunth. Valentine; Ewing (Bates); Nebraska City (Uni.).
   b. var. **compositus** Britton. Kennedy; Long Pine; Ewing; Atkinson; Columbus (Bates).
10. **C. speciosus** Vahl. (*ferax* Rich.). Annual; ditches and low ground. Valentine; Kennedy; Red Cloud; Columbus; Crete (Bates); Lincoln; Republican River Valley (Uni.).
11. **C. filiculmis** Vahl. Perennial. In poor, dry, sandy soil. Minden (Dr. Hapeman); Kennedy; Ewing; Callaway; Columbus; Red Cloud (Bates); Lincoln; Nebraska City; Louisville; Hardy; Republican (Uni.).
   a. var. **macilentus** Fernald. Lincoln; Hardy (Uni.).

This is certainly the prettiest genus among the sedges, with its graceful forms and golden shades. I wonder that more of our students do not collect it and help add something to our pleasure and knowledge.

II. Dulichium L. C. Richard

1. **D. arundinaceum** (L.) Britton. Perennial. In saturated soil, even in the edge of standing water. Rare. Endicott, Jefferson Co.; Bow Valley, Cedar Co. (Uni.); Kennedy; Ewing (Bates).

III. ELEOCHARIS R. Br. "Spike Rush"

1. **E. obtusa** (Willd.) Schultes. Annual. In mud holes. Rare. Nemaha, Nemaha Co. (Bates); Minden (Dr. Hapeman); Lincoln; Nebraska City (Uni.).
2. **E. engelmanni** Steud. Annual. In mud holes. Rare. Minden (Dr. Hapeman).
   a. var. **detonsa** Gray. Springview, Boyd Co. (Bates); Saunders Co. (Uni.).
3. **E. palustris** (L.) R. Br. Perennial. In saturated soil. Very variable. Chadron, Dawes Co.; Arabia, Cherry Co.; Springview; St. Paul; Red Cloud (Bates); Thedford; Cody's Lakes, Grant Co.; Lincoln (Uni.).

   My collections from Chadron, St. Paul and Red Cloud are absolutely flat stemmed and make as good a var. as many that are published. I shall call them here simply *forma compressa.*

   At Chadron this form occupies a basin of several acres, and is cut for hay whenever the season leaves the mud dry enough for teams. It produces a heavy crop and is highly esteemed.

   a. var. **glaucescens** (Willd.) A. Gray. Pauline (Dr. Hapeman); Anselmo, Custer Co.; Natick and Thedford, Thomas Co.; Sheridan Co.; Lincoln; Minden; Deuel Co. (Uni.); Glenn, Sioux Co.; Crawford and Bordeaux, Dawes Co.; Valentine; Kennedy; Long Pine; Arabia; Ewing (Bates). Our common form.

   forma **calva,** without bristles, in black alkali, Bassett, Rock Co.; Eli, Cherry Co. (Bates).

   The var. *glaucescens* is much more common than the species.

   For several years past, I have considered *glaucescens* a good species. But, upon getting all our material together, I find there is no absolute dividing line. It is an excellent var.
4. **E. acicularis** (L.) R. and S. Perennial. In saturated soil, mosslike, growing well but not fruiting under water. Minden (Dr. Hapeman); Valentine; Wood Lake; Atkinson;

Merriman (Bates); Sheridan Co.; Thedford; Grant Co.; Deuel Co.; Anselmo; Lodge Pole, Cheyenne Co.; Knox Co.; Bellevue; Lincoln; Louisville; Nebraska City (Uni.).

The neatest specimens I have ever seen grew on the bottom of the mill pond at Atkinson. The pond was drained in June, about the 1st. July 30th I collected it in full bloom; August 21, in fully ripe fruit.

5. **E. acuminata** (Muhl.) Nees. Perennial by running rootstocks. In low meadows and higher sandy soil. Valentine; Kennedy, two localities several miles apart; Simeon; Arabia; Long Pine; Ewing; St. Libory, Howard Co. (Bates); Minden (Dr. Hapeman); Lincoln; Kearney Co. (Rydberg); Franklin (Uni.).

Some of our forms are hard to separate from *tenuis,* not having the culms flattened so much as squared and grooved. That from St. Libory is typical. A collection made August, 1912 at Kennedy has the stems nearly square and the fruit quite conical-tipped. Gray's seventh edition remarks: "perhaps a var. of tenuis." Perhaps two varieties of *tenuis.* Ours all have the acuminate scales, more so than the descriptions demand. This is the only absolute mark of separation from *tenuis.*

IV. Stenophyllus Raf.

1. **S. capillaris** (L.) Britton. Annual. In saturated soil, sand bars, etc. Minden (Dr. Hapeman); Atkinson; Ewing; Swan Lake; all in Holt Co. (Bates). My achenes vary in all three specimens, those from Ewing being *depressed* truncate, those from Atkinson probably normal.

V. Fimbristylis Vahl.

1. **F. castanea** (Michx.) Vahl. Perennial. In sandy soil, several feet above water. Quite variable under the glass. Newark, Kearney Co. (Dr. Hapeman); Valentine; Scotia, Greeley Co.; Loup City (Bates); Thedford; Scotts' Bluff and Horse Creek, Scotts Bluff Co.; Franklin (Uni.).

a. var. **puberula** (Mx.) Britton. Callaway; Ewing (Bates). All my collections are more or less pubescent or scabrous and perhaps should come under the variety.

VI. Scirpus L.

1. **S. hallii** A. Gray. Annual. In moist, sandy soil, rare. Kennedy, Cherry Co.; southwestern Holt Co. (Bates). Undoubtedly is to be found in other localities.
2. **S. americanus** Pursh. (*pungens* Vahl.). Perennial. In shallow water and saturated soil. Valentine, Eli and Kennedy, Cherry Co.; Alliance, Box Butte Co.; Wood River, Hall Co.; Red Cloud (Bates); Thedford and Plummer's Ford, Thomas Co.; Anselmo, Broken Bow, Custer Co.; Aten, Cedar Co.; Hat Creek Basin, Sioux Co.; Lawrence Fork, Banner Co.; Franklin; Louisville, Cass Co.; Oshkosh, Deuel Co. (Uni.). Evidently all over the state.
3. **S. lacustris** L. (*S. validus* Vahl.). "Bulrush." Perennial. Chiefly in shallow water and marshes. Valentine; Callaway; St. Paul (Bates); Halsey, Thomas Co.; Thedford; Kiowa Valley, Scotts Bluff Co.; Newcastle, Dixon Co.; Talmadge, Otoe Co.; Nebraska City; Wahoo, Saunders Co.; Lincoln; Kearney, Buffalo Co.; Broken Bow, Custer Co.; Cherry Co., by Smith and Pound (Uni.); Newark (Dr. Hapeman).
4. **S. occidentalis** (Wats.) Chase. Similar, but longer spikelets and larger achenes. Kennedy (Bates); No. 22 collected by J. P. Sprecher. No locality. Probably in vicinity of Columbus (Uni.). I have included these two sheets here, because they answer the requirements of *occidentalis* in Gray's seventh edition. But I am convinced that it is a poor species, since the achenes vary much in shape and size, and one sheet has the long spikelets of this species and the small achenes of *lacustris*. It should be only a variety that could include all the forms with spikelets nearly 2 cm. long.
5. **S. heterochaetus** Chase. In Gray's seventh edition attributed to "Neb." There is none in our collection with "trigonous achenes."

6. **S. campestris** Britton. Perennial. In and around shallow water. Alliance, Box Butte Co.; Lincoln (Uni.); Alliance; Kennedy, on Lone Tree Lake; Lincoln (Bates).
   a. **S. campestris longi-spicatus** nov. var. We have in the Uni. Seminar collection one sheet collected by P. J. O'Gara at Laurel, Cedar Co., with simple spikes of a soft silvery gray, heavily streaked with red, spikelets five, 2.5–3.8 cm. long; achenes as in *campestris*. The plant was cut below the two upper leaves, but what we have is normal. I would not like to name a new species from our incomplete plant, but this is so striking a likeness to *campestris* that I venture this varietal name tentatively. I intend to visit the O'Gara homestead this season and collect, if possible.
7. **S. fluviatilis** (Torr.) Gray. Perennial. In ponds and marshes. Kennedy; Merriman; St. Paul; Columbus; Grand Island; Scotia (Bates); Newark (Dr. Hapeman); Lincoln; St. James, Cedar Co.; Whitman, Grant Co.; Newark (Uni.).
8. **S. atrovirens** Muhl. Perennial. In low ground, swales but not marshes. Weeping Water, Cass Co.; Nemaha, Nemaha Co.; Beatrice, Gage Co. (Bates); Minden (Dr. Hapeman); Lincoln; Minden; Talmadge, Otoe Co.; 2 sheets by J. P. Sprecher, probably near Columbus (Uni.).
9. **S. pallidus** (Britton) Fernald. Similar. A fairly good species. Broken Bow; St. James, Cedar Co.; Hitchcock Co.; Thedford; Dismal River, Hooker Co.; Crawford, Dawes Co.; Nebraska City, Otoe Co.; Kiowa Valley, Scotts Bluff Co.; Wahoo, Saunders Co. (Uni.); Valentine; Loup City, Sherman Co.; St. Paul, Howard Co. (Bates).

   It has been interesting to see how this species and variety (so-called up to the latest manual) are distributed in Nebraska. *S. atrovirens* alone is represented in the southeastern corner of the state, crops out in the middle third of Kearney Co.—two distinct collections—and gives way to *pallidus* in the northeastern part of Cedar Co., and in all the western two thirds except Kearney Co. I have seen it in many

other stations, easily identified by its olivaceous hue and compact head, but have failed to collect.

VII. Eriophorum L. "Cotton Grass"

All perennial; in bogs and springy, grassy ground

1. **E. gracile** Koch. (Roth. according to Gray's Man.). Lavaca, southwestern Cherry Co.; Simeon and Dewey's Lake, eastern central Cherry Co. (Bates); Dismal River, south of Thedford, Thomas Co. (Uni.); collected by Dr. Rydberg. This is all one region, and may define the limits of this species in Nebr. Iowa also reports but two counties.
2. **E. angustifolium** Roth. (*E. polystachyon* L. in part). Arabia, 16 miles southeast of Valentine, close by the railroad (Bates).
   a. var. **majus** Schultz. Kennedy, central Cherry Co. (Bates). Dr. Walker and companions found *angustifolium* at Simeon, west end of Dewey's Lake, in 1912. This will go into the Uni. collection.

VIII. Fuirena Rottb.

1. **F. simplex** Vahl. Perennial, but looking like an annual. Moist sandy soil. Minden (Dr. Hapeman); Platte River, Kearney Co.; Kearney, Buffalo Co.; 1 sheet by C. C. Engberg, who collected at Fremont on the Platte (Uni.). Not in Iowa list, but found at Stockton, Kas.

IX. Hemicarpha Nees and Arn.

1. **H. micrantha** (Vahl.) Britton. (*H. subsquarrosa* Nees.) Small annual in wet sand. Minden (Dr. Hapeman); Fremont, Dodge Co.; Cherry Co. (Smith and Pound); N. E. Neb. (Clements) (Uni.); Ewing; Long Pine (Bates). My Ewing specimens are 24 cm. long.
   a. var. **aristulata** Coville. Long Pine, Brown Co., on Long Pine Creek (Bates); with squarrose awns.

X. Carex L.

Species all perennial; the largest and most difficult genus

Eucarex

1. **C. lupulina** Muhl. In swamps. Fremont Island in the Platte River, Fremont, Dodge Co., collected by Engberg (Uni.); Callaway (Bates).
2. **C. hystricina** Muhl. In saturated banks and swales. Halsey; Central City, Merrick Co.; Broken Bow; Aten, Cedar Co.; Thedford; War Bonnet Canon, Sioux Co.; Whitman, Grant Co.; Lincoln (Uni.); Ft. Robinson and Crawford, Dawes Co.; Valentine; Long Pine; St. Paul; Burwell; Red Cloud (Bates). All over the state.
3. **C. pseudocyperus** L. In bogs. In the Lake region of Grant Co., 20 miles south of Whitman (P. A. Rydberg only, Uni.).
4. **C. comosa** Boott. In bogs. On Gordon Creek north of Simeon P. O. about 4 miles, Cherry Co. (Bates); near Oasis P. O., Cherry Co. (R. J. Pool, Uni.).
5. **C. squarrosa** L. In bogs. Lincoln (H. J. Webber only, Uni.).
6. **C. trichocarpa** Muhl. In ditches and moist banks. Nemaha; Hastings (Bates); with the impressed nerves and glabrous perigynia of *deweyi* Bailey, and the length of spikes of the species; also Minden (Dr. Hapeman); Minden (Rydberg); Emerson, Dixon Co.; Nebraska City; this last with scales partly aristate (Uni.).
   a. var. **aristata** R. Br. Whitman, Grant Co. (Hapeman); Mullen (Uni.).
   *a*1. **aristata imberbis** Gray. Ashland, Saunders Co. (Uni.); Neligh, Antelope Co.; Arcadia, Valley Co.; Scotia, Greeley Co. (Bates);
   *a*2. **aristata confusa,** nova forma. Kennedy, Cherry Co. (Bates); 1 meter high, leaf 7.5 mm. wide, sheaths densely pubescent; perigynia hairy as in *trichocarpa,* teeth spreading, scales mostly aristate, spikes 7–9 cm. long.

It is easily seen that this can not be placed under any described form; and it becomes equally evident that *one species* with two main varieties and other sub-species is a better treatment than the two species as given in Britton's Manual.

7. **C. riparia** Curtis. In swales and marshes; very dark green; taking the whole ground and making heavy hay, where not too wet to cut. Laurel, Cedar Co.; Otoe Co. (Uni.); Callaway, Custer Co.; Scotia, Greeley Co.; St. Paul, Howard Co.; Nemaha, Nemaha Co. (Bates). Probably to be found in several more stations.
8. **C. lanuginosa** Michx. (*filiformis latifolia* Boechl.). In swales and banks. Extremely common. Minden (Hapeman); Nebraska City; Thedford; Anselmo; Crawford; Pine Ridge, Sheridan Co.; Whitman (Uni.); Red Cloud; Ewing; St. Paul; O'Neill; Crawford; Harrison, Sioux Co. (Bates).
9. **C. parryana** Dewey. In the Platte meadows, a few feet above water. Rare; probably introduced from Wyoming by the waters of the Platte. Minden (Dr. Hapeman); Minden (Bates, under guidance of Dr. Hapeman).
10. **C. fusca** All. (*buxbaumii* Wahl.) (*polygama* Schkuhr.). In marshy ground; rare. S. W. Holt Co. and northeast of Newport at Kirkwood P. O., probably over the line in Holt Co. (Bates).
11. **C. stricta** Lam. In bogs and wet banks; very common in some form. Halsey; Norway, Thomas Co.; fairly typical (Uni.).
    a. var. **angustata** (Boott.) Bailey. Lincoln; Valentine; Minden; Emerson, Dixon Co. (Uni.); Merriman; Valentine; Johnstown; St. Paul (Bates); Minden (Hapeman).
    b. var. **decora** Bailey (*C. haydeni* Dewey). Minden (Hapeman in my herbarium; not in his specimens in University or Minden). The achenes are obovate, which is the only mark separating it from *angustata.*

The *angustata* type, varying greatly in style of scales and length of spikes, prevails throughout the state. In many

specimens the scales are half obtuse and half lengthened-acute or acuminate. It should not be thought of as two species, for the forms are innumerable in this one state. A specimen sent in after this species was written up, collected in Grand Island, Hall Co., by Prof. C. J. Elmore, very young, has the almost orbicular achenes called for by *decora,* together with the lengthened scales. It was rightly named by the collector. It is simply another remarkable variation in this species, being quite unlike the Minden *decora* above.

12. **C. nebraskensis** Dewey. In saturated soil, spring holes and swales. Over all the western part of the state. Chadron, Dawes Co.; Kennedy, Valentine and Arabia, Cherry Co.; Callaway, Custer Co. (Bates); Sioux Co.; Pine Ridge, Sheridan Co.; Broken Bow and Anselmo, Custer Co.; Lawrence Fork, Banner Co.; Deuel Co.; Thedford and Halsey, Thomas Co.; Mullen, Hooker Co. (Uni.). One of my Kennedy collections, Aug. 1912, has nearly all the pistillate spikes staminate for one third of the upper end, a character that is given to *C. aquatilis* in the manuals. A very glaucous form is common, not noticed in manuals. The achenes of this interesting species vary from 3.5–4.25 mm. long, and from ovate to elliptic and obovate. The elliptic forms are from Arabia and Hat Creek basin.

13. **C. aquatilis** Wahl. In the marsh of Boardman Creek, Kennedy, Cherry Co., due west of the old John Bachelor Ranch House, in at least two large patches, covering many square rods (Bates, 1911, 1912). This marsh some 8 miles long and half a mile wide is the home of *Carex limosa* L., *C. aquatilis* Wahl., *Cyperus engelmanni* Steud., *Eriophorum angustifolium* Roth., *Caltha palustris* L., *Aster junceus* Ait., and other rare plants. Yet I have been the only botanical visitor for 24 years. It is worthy of exploitation by the best.

14. **C. limosa** L. In the mossy marsh of Boardman Creek, Kennedy, as above. Near *C. aquatilis* (Bates).

15. **C. davisii** Schwein. and Torr. Lincoln and Otoe Co. (Uni.).

Britton says "moist thickets and meadows." A very pretty species; should be looked for in the other eastern counties.

16. **C. longirostris** Torr. On dry wooded slopes. Valentine; Long Pine (Bates); Nebraska City; "Bluffs of the Missouri"; Dismal River, Thomas Co. (Uni.). Also Halsey.
17. **C. grisea** Wahl. In rich woods. Nemaha (Bates); Pauline (Dr. Hapeman); Nebraska City; Crete, Saline Co.; Ashland, Saunders Co. (Uni.).
    a. var. **angustifolia** Boott. (*C. amphibola* Steud.). Nebraska City (Uni.). A very variable species. Our forms unite the characters of the species and variety in a way quite impossible to separate. One of the Nebraska City collections conforms so nearly to the variety that I have thought best to enter it there.
18. **C. granularis** Muhl. In low meadows. Kennedy; Burwell; Loup City; St. Paul; Red Cloud (Bates); Fremont; Plummer's Ford, Thomas Co. (Uni.). Long overlooked and doubtless more widely spread.
19. **C. crawei** Dewey. In similar situations, probably on a little higher ground. Merriman, Cherry Co.; Bassett, Rock Co.; O'Neill, Holt Co.; Burwell, Garfield Co.; Scotia, Greeley Co.; Loup City, Sherman Co.; St. Paul, Howard Co. (Bates); Minden, Kearney Co. (Dr. Hapeman); Valentine, Cherry Co.; Central City, Merrick Co. (Uni.).
20. **C. oligocarpa** Schk. "In dry woods and thickets." Nebraska City (Uni.); collected by J. J. Thornber only.
21. **C. tetanica** var. **woodii** (Dewey) Bailey. In low meadows. Minden (Dr. Hapeman); Oshkosh, Deuel Co. (Uni.), R. J. Pool, June 5, 1912. We need more searching for this plant. The material is not quite satisfactory.
22. **C. meadii** Dewey. In same soil as *crawei* and easily confused with it. A good species. Minden (Dr. Hapeman); Wood River, Hall Co.; O'Neill and Inman, Holt Co. (Bates); Crete; Lincoln; Nebraska City (Uni.).
23. **C. laxiflora** Lam. var. **gracillima** Boott. In dry thickets. Nemaha; wider leaves, 8 mm., Lincoln, west of Penitentiary; Red Cloud; Scotia; Bordeaux, Dawes Co.; Johns-

town, Brown Co. (Bates); Lincoln; Hardy; "Prairies of the Missouri"; Plummer Ford, Thomas Co. (Uni.). These all have the "plump obovoid" perigynia with spikes too short and compact for the species.

a. var. **varians** Bailey. Long Pine; Valentine (Bates); Pauline (Dr. Hapeman); Nebraska City, several sheets from three collections (Uni.). These all have more ellipsoid-obovate perigynia, with upper spikes approximating. These divisions have to be forced more or less to receive our forms. The width of leaves seems to have little value. East and west cut no figure. I don't suppose any one else would have made exactly this alignment without consultation, but I am convinced it is as good as any other, and that is not satisfactory to me. I am willing some one else should tackle them.

24. **C. aurea** Nutt. In low meadows. Crawford; Valentine; Ft. Niobrara; Callaway; Loup City (Bates); Thedford (Dr. Hapeman); Pine Ridge; Hat Creek Basin; Thedford (Uni.). I have seen it in many places without collecting.

25. **C. setifolia** (Dewey) Britton (*C. eburnea* Boott.). On dry wooded slopes; rare. Merriman and Ft. Niobrara, Cherry Co.; Scotia, Greeley Co. (Bates); "Bluffs of the Missouri" (Clements) (Uni.). A beautiful species.

26. **C. pennsylvanica** Lam. Dry, sandy prairies and thickets. Valentine; Sargent; Long Pine; Red Cloud (Bates); Gordon; Thedford; Ponca, Dixon Co.; Deuel Co.; Crete; Nebraska City (Uni.). Very common and therefore neglected.

27. **C. varia** Muhl. Dry, wooded slopes; rare. Ft. Niobrara; Long Pine; Neligh, Antelope Co. (Bates).

a. var. **colorata** Bailey. Nebraska City, J. J. Thornber (Uni.).

28. **C. durifolia** Bailey (*backii* Boott.), var. nova *subrostrata.*

Perigynium subglobosum e basi producta, 4 mm. longum 2.1 mm. latum plus minus, non regulariter triquetrum; rostrum 1 mm. longum plus minus, crassum truncatum non hyalinum, apice cylindricuum; basis c. 1 mm. longa fulva;

herbae 3 dm. altae robustae; folia viridissima pertinentia ad radicem, per hiemem semper virentia. Herbae abundantes in valle nemorosa ad Long Pine, Nebraskae.

Perigynium subglobose from a lengthened base, 4 mm. long, 2.1 mm. wide, more or less, irregularly triangular; beak 1 mm. long, more or less, stout, truncate, not hyaline, cylindrical at the apex; base about 1 mm. long, tawny; plants 3 dm. tall, vigorous; radical leaves very dark, evergreen throughout the winter. Plants abundant in the wooded canon near Long Pine, Nebraska.

I have collected this variety also at Valentine, Ft. Niobrara, and eight miles east at Parry's Falls, and at Merriman, sixty miles west of Valentine; thus extending the known range about 125 miles in Brown and Cherry counties. Specimens have been deposited in State University, Columbia University, Gray Herbarium and several private herbaria. My Quebec specimens agree perfectly with the cuts and descriptions of Boott., Gray and Britton and Brown.

In dry, sandy thickets and open places. May and June.[2]

29. **C. filifolia** Nutt. "Nigger head." On dry bluffs and open prairies, forming masses of black, wiry roots which when plowed will roll under the harrow and be on top of the soil for several seasons. Ft. Robinson; Valentine; Long Pine; Gordon; Butte, Boyd Co. (Bates); "Deuel Co. Rydberg" (Uni.). Probably the only reason this has not been collected more is because it blooms the first week in April and drops its fruit before collectors can get out on vacation work. Add Stratton, Hitchcock Co. (Hapeman).

VIGNEA

30. **C. stenophylla** Wahl. On high, dry prairies. Blooms at same time as *filifolia,* forming the earliest pasture. Craw-

[2] Since completing the description of *Carex durifolia subrostrata,* I have received a specimen of *C. durifolia* from Wyoming, by the courtesy of Prof. Aven Nelson. It agrees quite fully with the eastern form and leaves ours unique. Our achenes also have nearly twice the bulk of the Wyoming form. Ours would make as good a *species* as very many others.

ford; Valentine; Johnstown; Long Pine; Kennedy; St. Paul; Loup City; Riverton, Franklin Co. (Bates); Minden (Dr. Hapeman); Oshkosh; Hardy; Franklin; Thedford (Uni.). Very common and widespread.

31. **C. douglasii** Boott. In like situations; rather rare. Crawford; Valentine; Kennedy (Bates); Sheridan Co.; Anselmo, Custer Co.; Halsey and Thedford, Thomas Co. (Uni.).

32. **C. stipata** Muhl. In saturated soil. Valentine; Long Pine; Red Cloud; Callaway; St. Paul (Bates); Thedford; Anselmo; Plummer's Ford; Halsey; Crete (Uni.).

33. **C. crus-corvi** Shufflw. In saturated soil. Nemaha (Bates); Lincoln (Uni.). Our coarsest species. Probably very rare, as it is quite fit for collection all summer.

34. **C. marcida** Boott. In dry soils, running down to low meadows. Very abundant in the western two thirds. Minden (Dr. Hapeman); Kennedy; Oasis, Cody, in Cherry Co.; O'Neill; Scotia; St. Paul; Red Cloud (Bates); Alliance; Anselmo; Broken Bow; Pine Ridge; Mullen; Thedford; Wiegand, Knox Co.; Franklin (Uni.). Usually dioecious; varying much in size and color of perigynia.

35. **C. teretiuscula** Gooden. In marshes, forming tussocks; rare. Simeon on Gordon Creek, on Geo. Beer's old claim (Bates). "On Middle Loup River, near Thedford," Rydberg, and a second sheet with no locality, but a different date (Uni.).

    a. var. **prairea** (Dewey) Britton (*C. diandra ramosa* (Boott.) Fernald). Burwell, in marsh of the North Loup, half a mile north of town (Bates). A good variety; hardly a species.

36. **C. gravida** Bailey. In dry woods and prairies; very common. Minden (Dr. Hapeman); Holly, Sheridan Co.; Valentine; Callaway; Lincoln; Red Cloud (Bates); Ponca; Diller, Jefferson Co.; Shelton, Buffalo Co.; Kearney Co.; Lincoln; Nebraska City; War Bonnet Canon, Sioux Co. (Uni.). Probably the most widespread species in the state, long confused with other species. Several of our sheets would fall under var. *laxifolia* Bailey, which is nothing but a

protected, woodsy, long-leaved and long-stemmed form not worthy of distinction.

37. **C. vulpinoidea** Michx. In low meadows. Minden (Dr. Hapeman); Valentine; Scotia; O'Neill; Nemaha; Burwell; Callaway; St. Paul (Bates); Anselmo; Ponca; Talmadge and Syracuse, Otoe Co.; Elmwood, Cass Co.; Bloomington, Franklin Co.; Nebraska City (Uni.).

38. **C. sartwellii** Dewey. In moist hay meadows, not "in swamps" with us. Kennedy and Arabia, Cherry Co.; O'Neill and southwest Holt Co. (Bates).

39. **C. rosea** Schk. In dry woods. Lincoln; Nebraska City; Weeping Water; Ponca (Uni.); Nemaha (Bates).

40. **C. sparganioides** Muhl. In dry woods. Lincoln; Nemaha (Bates). Nebraska City (Uni.). It can be found in a pasture half a mile west of the Penitentiary.

41. **C. muhlenbergii** Schk. var. **enervis** Boott. In dry woods. Nemaha (Bates); Nebraska City; Lincoln (Uni.). J. G. Smith's Lincoln form has perigynia 4–5 mm. long. Thornber's sheet "1898" has them 3–4 mm.; his sheet "1899," both "Nebraska City," has them 3 mm.+. Mine from Nemaha have 3 mm. Otherwise they agree very well with the books, which say "3 mm."

42. **C. interior** Bailey (*C. scirpoides* Schk.). In spring holes and saturated grassy meadows. Middle Loup River, Thedford (Uni.); Valentine; Simeon; Burwell; Callaway (Bates).

43. **C. tribuloides** Wahl. In low meadows. Long Pine, Brown Co.; Ewing, Holt Co.; Lincoln, Lancaster Co.; Nemaha, Nemaha Co. (Bates). Rare.

44. **C. scoparia** Schk. In low meadows; common. Kennedy; Valentine; Long Pine; O'Neill; Arabia; Minden (Bates); Ewing; Thedford; Grand Island (Uni.).

a. var. **condensa** Fernald. Springview; Ewing (Bates).

45. **C. cristatella** Britton (*C. cristata* Schwein.). Low hay meadows, and borders of bogs; not common. Wabash, Cass Co.; Nebraska City; Lincoln; "Bluffs of the Missouri," N. E. Neb. (Uni.); Long Pine; Ewing; Norfolk; St. Paul; Burwell; Weeping Water; Neligh (Bates). My

collection of Sept. 16, 1893, Neligh, Antelope Co., on the banks of the Elkhorn River, is magnificent in size, color and squarrose perigynia. March 26, 1910, I collected the sterile, leafy culms of 1909 at St. Paul, Neb., *growing* at top and side shoots, and have them mounted. They had shot out 1–2 inches of green growth.

46. **C. mirabilis** Dewey. One over-ripe sheet from Nemaha must go here (Bates).

    C. mirabilis Dewey var. **perlonga** Fernald. Dry woods. Nebraska City (Uni.); J. J. Thornber, only 1 sheet. I have a sheet from Central Michigan that agrees well with this.

47. **C. straminea** Willd.

    var. **echinodes** Fernald. "Kearney, Islands of Platte River, July 20, 1901" (Uni.), J. J. Thornber. A fine sheet. It is a pity we have not more of it.

48. **C. festucacea** Willd. In dry soil, extending to the margin of swales, Minden (Dr. Hapeman); Franklin; Hitchcock Co.; Halsey (Uni.); Nemaha; Valentine; Beatrice (Bates). My Beatrice collection and one sheet from Nemaha might pass for *suberecta* (Olney) Britton, on account of width of perigynia, but the description of scales does not call for any change. I doubt the necessity of the new species. *C. festucacea* is an extremely variable species, but the variations can be found on the same plant, as in species of Crataegus.

    a. var. **brevior** (Dewey) Fernald. Nebraska City; Lincoln; Ponca; Anselmo; Kearney Co. (Uni.); Arabia; O'Neill; Long Pine; Ewing (Bates). A variety of no importance, as it is quite uncertain under which head to put some of our forms. Perhaps the most universal species in the State.

49. **C. bicknellii** Britton. In low meadows. O'Neill and Ewing, Holt Co.; Weeping Water, Cass Co. (Bates).